

Physics Department Activities Update Fall 2009:

Student population:

Since we had a very large group of graduating seniors in the Spring of 2008, some of whom had managed to finish their degrees in a shorter than 4-year period, we have not had any new graduates in the Spring of 2009. Our only graduate last academic year was David Upshaw. After his graduation in December he took a couple of months off, still being around and helping in the department. Later in the spring he applied and was accepted to the graduate M.S./Ph.D. program in Mechanical Engineering in Texas Tech University. He has immediately found the graduate advisor and started working on research and took classes towards his degree even during this summer. He is now full time graduate student in Texas Tech and very excited about his new career path.

Our senior class is rather small; we are planning on having two graduates (Todd Neer and Jeanette Schofield) this coming spring. However, both sophomore and junior classes look very strong and promising. There are 5 juniors and 5 sophomores this year. At the moment there are 8 students enrolled into the University Physics course, 5 of whom have declared physics major. Another interesting phenomenon we have faced this year is a significant increase in enrolment for our General Physics course. This has occurred mostly because of the Exercise Science and Pre-physical Therapy majors, who are now required to take physics. For the first time the department had offered both General Physics I and II during the summer. We are also offering two sections of General Physics I lecture and 4 sections of General Physics I lab this fall.

Student Research Projects:

As we said, we are going to have two graduates in the spring. Both of them have started working on their senior research projects. Todd Neer has proposed building a prototype ultrasonic dog deterrent device into a wristwatch case for joggers. This project has significance for him, not only from the physics standpoint, but also as a runner who has been attacked by dogs several times. Jeanette Schofield is proposing a project to do computational modeling of the trajectory for a spacecraft to study Europa, one of the moons of Jupiter.

With large junior and sophomore class (many of whom want to finish in 3 years), we expect many people to start working on their proposals for senior research in spring.

Departmental Activity:

In early April all physics faculty, accompanied by four students (Michael Herriage, Michael Luvaul, Jeanette Schofield, and David Upshaw) attended the Texas Section of the American Physical Society/ American Association of Physics Teachers/ Society of Physics Students meeting at Tarleton State University in Stephenville. Our students Michael Herriage and Jeanette Schofield (in collaboration with Aaron Ward) presented a poster devoted to the results of their observational astronomy trip to Arizona last May. Michael Luvaul (physics freshman and math sophomore!) gave a talk to review the basic ideas behind Quantum Information Theory. At the moment Michael thinks that this subject may become an area for his future research as physics senior and later in graduate school. Michael has given the same talk during the local math conference at Abilene Christian University earlier the same month. In late April on his own Michael Luvaul attended a Quantum Information Theory workshop at Massachusetts Institute of Technology (Cambridge, MA). He has told us about what he learned during the workshop at a special presentation during the last SPS meeting of this semester.

In late April several physics students, including Michael Herriage, Michael Luvaul, Jeanette Schofield, Aaron Ward, and Austin Wegner participated in the McMurry Student Poster competition. Even though none of them became a finalist this year, we appreciate their effort and hope that they as well as other physics students will participate in this competition in the future.

Among the faculty the following can be noted:

In March, Dr. Bykov (accompanied by Dr. Kosheleva, Visiting Assistant Professor of Psychology, Dr. Bykov's wife and collaborator on physics education projects) attended a New

Physics Faculty workshop reunion and National American Physical Society meeting in Pittsburgh, PA. During the workshop reunion Dr. Bykov presented a poster entitled "Development of student-centered innovative curricula for advanced physics laboratory", which was based on the work he has done to redesign the Advanced Physics Laboratory course and create a new lab manual for this course and which was supported by the Sam Taylor Foundation grant two years ago. During the national APS meeting Dr. Bykov (in collaboration with Dr. Kosheleva) gave a talk entitled "Taking inquiry to the next level: Tablet PC's to stimulate active learning and unify introductory physics curriculum". In his talk Dr. Bykov presented the intermediate results of his ongoing effort to modify the teaching strategy in the University Physics course to convert it into a system of flexible instructional modules, where lecture, lab, and discussion are merged into one technologically and collaboratively rich experience and Tablet PCs are integrated as a single unifying technology to improve continuity among various module components. Dr. Bykov has worked on this project for several years. Starting this academic year, the University Physics course has been finally transformed into a series of instructional modules as described above. Dr. Bykov is looking forward to the results of the first complete piloting of his new teaching approach.

Dr. Keith (along with Dr. Martin of Math, and Dr. Veltkamp of Chemistry) have been working to develop the McMurry Center for Mission Outreach with Science and Technology (MCMOST). In the spring the professors participating in the center team-taught the "Leadership Science and Mathematics" course for the first time. The Faculty teaching the course and the students taking the course designed and implemented an outreach project to support the teaching of Physical Science at the rural high school in Clyde, TX in order to improve the TAKS scores of underperforming 11th grade students. The project involved having the high school students build and fly Estes model rockets and included dozens of trips to Clyde by teams of McMurry students and faculty over a three week period and culminated in a field trip by Clyde students to McMurry where larger rockets were launched and science demonstrations performed. The McMurry students completed the course by packaging the materials and worksheets they wrote for the project for other schools to use in the future.

In May Dr. Keith travelled to Toronto, Canada to participate in the spring meeting of the American Geophysical Union where he gave a talk on his recent work entitled "Multi-satellite investigations of the cusps and the effect of various pitch angle sorting algorithms". This work seeks to understand the behavior of particles from the Sun that penetrate the Earth's magnetic field by comparing data from two very different satellite missions.

Due to the efforts of Dr. Renfro, the Society of Physics Students is planning a field trip to tour a wind-energy farm this week. He is also attending the New Physics Faculty Workshop, sponsored by the American Association of Physics Teachers (AAPT) and the National Science Foundation (NSF), in the American Center for Physics (College Park, Maryland) this November. With Dr. Renfro going to this workshop, the McMurry Physics Department will probably become the first physics department in the Nation where all the faculty members will be the workshop alumni. The New Physics Faculty Workshop has been supported by NSF during the last 13 years and has become a model in the STEM educational fields for successful training of young faculty. This makes us especially proud of Dr. Renfro's participation. Dr. Renfro is also working on constructing a wind tunnel that will be used for student projects and studying interferometry of fluttering objects.

The McMurry weather station, a joint project between Physics, Geosciences Program, and Building Maintenance, is nearing the completion of its first year of collecting wind data for the roof top wind generation feasibility study. A solar sensor was just added to the sensors begin collecting solar data to study the feasibility of roof top generation using solar panels. These studies will give the university a preliminary idea as to the cost effectiveness of using onsite alternative energy generation. The weather station data is also aiding the facilities manager in their decisions concerning building environment control and grounds keeping.

Along with two other Science Departments, the Physics Department has submitted the two-part proposal to the Science Building Lab Renovation Competition. The Physics Proposal was entitled "Flexible Instructional Space for Teaching Science Courses with emphasis on Inquiry and Collaborative Active Learning". In the first part of this proposal we have suggested modifications to

the rooms S104, S105, and S106 to make them more flexible and accommodating for the modern technology and inquiry-based teaching methods. In the second part of the proposal, we have suggested changes to improve our upper division laboratory and student gathering space (room S120). We are now looking forward to hear the committee's decision and sincerely hope that at least one of our proposals will be chosen.